CLAIMS:

    1.   A method of controlling passage of a train employing a plurality of locomotives through a tunnel so as to meet a movement plan, the method comprising:

    configuring predetermined operating characteristics of at least one selected
5   locomotive in the train in preparation for the passage of the train through the tunnel as the train approaches an entrance to the tunnel;

    monitoring conditions within the tunnel and the performance of the selected locomotive as the train passes through the tunnel, including dynamically changing the configuration of the operating characteristics of the selected locomotive as a function
10   of the monitored conditions within the tunnel and the performance of the selected locomotive while in the tunnel, so to achieve tractive effort sufficient to move the train through the tunnel in accordance with the plan and to optimize the performance of the locomotive; and,

    reconfiguring the operating characteristics of the selected locomotive as the
15   train approaches the exit of the tunnel to facilitate recovery of the selected locomotive from the effects of passage through the tunnel.

    2.   The method of claim 1 further including dynamically changing the configuration of the selected locomotive as the train approaches, passes through, and exits the tunnel.

20   3. The method of claim 2 further including ascertaining the location of the train relative to the exit from the tunnel and configuring the selected locomotive for recovery from passage through the tunnel prior to the locomotive reaching the tunnel exit.

    4.   A method of configuring a locomotive in preparation for passage of a
25   locomotive for passage through a tunnel comprising:

    determining the current operating condition of the locomotive;

    establishing a desired set of operating conditions for entry of the locomotive into the tunnel;

    determining the time or distance for the locomotive to reach the tunnel
30   entrance; and,

changing the performance characteristics of the locomotive to attain the desired set of operating conditions within the time or distance for the locomotive to reach the tunnel entrance.

5. The method of claim 4 in which the locomotive is one of a plurality of locomotives comprising a consist and the method includes changing the operating conditions each locomotive in the consist to a desired set thereof prior to each locomotive reaching the tunnel entrance.

6. The method of claim 5 further including dynamically changing the operating conditions of the locomotives to attain the desired set of operating conditions for each locomotive.

7. The method of claim 6 wherein the locomotive comprises an engine having a cooling system, and traction motors having cooling systems, and in which the desired set of operating conditions for each locomotive includes at least one of the power rating of the locomotive engine, the temperature of the engine cooling system, the temperature of the locomotive traction motor cooling systems, and the tractive effort of other locomotives in the consist.

8. The method of claim 5 in which adjusting the performance of each locomotive is controlled by a computer on each locomotive.

9. The method of claim 5 in which adjusting the performance of each locomotive is controlled by a computer on one of the locomotives which controls an operation of each of the locomotives.

10. The method of claim 5 in which adjusting the performance of each locomotive is controlled by remotely monitoring the current operating conditions of each locomotive and transmitting a control signal to each locomotive to adjust its performance to the desired set of operating conditions.

11. The method of claim 4 in which determining the time or distance of the locomotive relative to the tunnel entrance includes monitoring a wayside distance signal provided to the locomotive.

12. The method of claim 11 in which determining the time or distance of the locomotive relative to the tunnel entrance includes providing global positioning system (GPS) information to the locomotive.

13. The method of claim 4 in which determining the time or distance of the locomotive relative to the tunnel entrance includes accessing a track map database stored on the locomotive, the database including information on anticipated conditions within the tunnel.

14. The method of claim 6 in which configuring each locomotive for passage through the tunnel includes derating at least one of the locomotives by reducing its power output from a nominal level of operation.

15. The method of claim 14 further including placing one or more of the locomotives in an idle condition.

16. The method of claim 4 wherein the locomotive comprises an engine having a cooling system and the method further includes increasing the level of heat dissipation of the locomotive cooling system to lower oil and water temperatures within the engine prior to entry of the locomotive into the tunnel.

17. A method of controlling passage through a tunnel of a train employing a plurality of locomotives including a lead locomotive and at least one trailing locomotive so as to meet a movement plan comprising:

monitoring conditions within the tunnel;

monitoring the performance of each trailing locomotive as the train passes through the tunnel; and

dynamically changing the configuration of the operating characteristics of each trailing locomotive as a function of the monitored conditions within the tunnel and the current performance of each trailing locomotive while in the tunnel, so to achieve tractive effort sufficient to move the train through the tunnel in accordance with the plan and to optimize the performance of each trailing locomotive.

18. The method of claim 17 further including dynamically changing the configuration of the trailing locomotives based upon the monitored conditions and each locomotive's performance.

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19. The method of claim 17 wherein the locomotive comprises an engine and the monitoring includes measuring parameters indicative of the level of oxygen available for combustion by the locomotive engine at at least one location within the tunnel.

5   20. The method of claim 19 wherein the monitoring conditions within the tunnel further includes measuring the air temperature within the tunnel at at least one location within the tunnel.

21. The method of claim 20 further including extrapolating from the measured values, oxygen availability and tunnel temperature at intermediate locations within the

10   tunnel.

22. The method of claim 17 wherein configuring the locomotive for passage through the tunnel includes sensing an ambient temperature change which occurs when the locomotive enters the tunnel whereby the locomotive can be configured for passage through the tunnel even if the entrance to the tunnel cannot be determined prior to the

15   locomotive entering the tunnel. Belongs with the claim 18 set of claims?

23. The method of claim 18 wherein the monitoring the performance of each trailing locomotive includes measuring the tractive effort of each locomotive.

24. The method of claim 21 further including derating a locomotive if available oxygen within the tunnel decreases, the air temperature within the tunnel rises above a

20   predetermined level, or the locomotive engine temperature rises above a predetermined temperature.

25. The method of claim 17 wherein dynamically changing the operation of a trailing locomotive includes adjusting locomotive operating characteristics as a function of at least one of oxygen availability, tunnel length, grade, total load, air flow,

25   internal heat dissipation, and altitude.

26. A method of configuring a locomotive in a train in preparation for exit of the locomotive from a tunnel comprising:

determining the current operating condition of the locomotive while in the tunnel;

determining a desired set of operating conditions for the locomotive as the train exits the tunnel to facilitate recovery of the locomotive from the effects of passage through the tunnel and attain a desired post-tunnel configuration as quickly as possible upon exiting the tunnel;

5   determining the time or distance for the locomotive to reach the exit from the tunnel; and

changing the performance characteristics of the locomotive to attain the desired set of operating conditions within the time or distance for the locomotive to reach the tunnel exit.

10   27. The method of claim 26 in which the locomotive comprises an engine having a cooling system and traction motors having cooling systems, and changing the locomotive performance characteristics includes adjusting at least one of the power rating of the locomotive engine, the temperature at which the engine cooling system is operating, the temperature the locomotive traction motor cooling systems, and the

15   tractive effort of other locomotives in the train.

28. The method of claim 26 in which changing the performance characteristics of the locomotive is controlled by computer on the locomotive.

29. The method of claim 26 in which determining the time or distance for the locomotive reach the exit includes accessing a track map database maintained on the

20   locomotive.

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